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ABSTRACT

This study of 180 pressure-treated wood samples shows that treated wood is a much greater source of arsenic exposure for children than arsenic-contaminated drinking water. The report determines that an average 5-year-old, playing less than 2 weeks on a chromated-copper-arsenate-treated (CCA) wood play set would exceed the lifetime cancer risk considered acceptable under federal pesticide law. Chapters examine the study's evidence, explain why the Federal Safety Study by the U.S. Consumer Product Safety Commission is outdated and inadequate, and explore why the CCA risk is mounting. The report's final chapter presents study conclusions and recommendations. An appendix presents a summary of data for surface arsenic levels of CCA wood and soil beneath treated wood structures. (Contains 28 references.) (GR)

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POISONED PLAYGROUNDS

Arsenic in 'Pressure-Treated' Wood

EF 006 011

ENVIRONMENTAL WORKING GROUP

HEALTHY BUILDING NETWORK
healthybuilding.net

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Contents

Executive Summary 1

Chapter 1: Arsenic: The Wood Industry's Toxic Secret 3

Chapter 2: Arsenic-Treated Lumber Is Hazardous to Children's Health 7

Chapter 3: Federal Safety Study Outdated & Inadequate 9

Chapter 4: Evidence of CCA's Risks Is Mounting 13

Chapter 5: Conclusions and Recommendations 15

References: 17

Appendix: 19

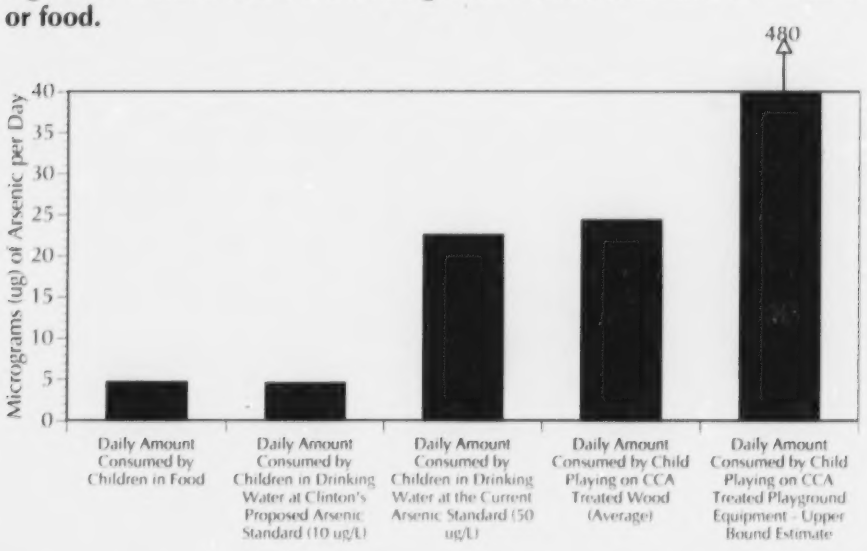
Executive Summary

The wood in most playground sets, picnic tables and decks contains potentially hazardous levels of the same poison at the center of the debate over the safety of America's drinking water: arsenic. An Environmental Working Group analysis finds that even if the U.S. Environmental Protection Agency keeps its promise to lower permissible levels of arsenic in drinking water, it will not be able to protect the nation's children from arsenic unless it regulates a more pervasive source of arsenic in "pressure-treated" wood.

Outside of the wood products industry, it's a little-known fact that arsenic-laced wood is just about everywhere: in playground equipment, picnic tables, decks, fences, docks, foundations – basically, any outdoor use of lumber. Virtually all of the lumber sold for outdoor uses in the United States is pressure-treated, a misleading term that hides the fact that the wood is injected with vast amounts of toxic compounds to preserve the wood and kill termites.

The most common wood preservative used in the United States is chromated copper arsenate (CCA), an insecticide that is 22 percent pure arsenic. Numerous laboratory and field studies show definitively that potentially hazardous amounts of arsenic in CCA leach out of pressure-treated lumber,

Figure 1. Treated wood is a much greater source of arsenic for children than drinking water or food.


480
Micrograms (ug) of Arsenic per Day
40
35
30
25
20
15
10
5
0
Daily Amount Consumed by Children in Food
Daily Amount Consumed by Children in Drinking Water at Clinton's Proposed Arsenic Standard (10 ug/L)
Daily Amount Consumed by Children in Drinking Water at the Current Arsenic Standard (50 ug/L)
Daily Amount Consumed by Child Playing on CCA Treated Wood (Average)
Daily Amount Consumed by Child Playing on CCA Treated Playground Equipment - Upper Bound Estimate

Source: Environmental Working Group. Exposures are representative for a 4-6 year old child. See Endnote in Appendix for methodology.

where it may be ingested or absorbed by people or animals, or may contaminate water sources or soil beneath the wood.

Our analysis of national data from 180 wood samples shows that treated wood is a much greater source of arsenic exposure for children than arsenic-contaminated drinking water. Based on an extensive review of the scientific literature, EWG estimates that a 40-pound child who plays daily on arsenic-treated wood could be exposed to more than five times the arsenic allowed under EPA's proposed drinking water standard (10 parts per billion) that has been delayed for more review by the Bush Administration (Figure 1). Less than 10 percent of all water systems in the U.S. contain arsenic at 10 ppb (USGS 2000), whereas the vast majority of American children have some contact with CCA-treated wood.

In less than two weeks an average five year old playing on a CCA-treated playset would exceed the lifetime cancer risk considered acceptable under federal pesticide law.

Arsenic is classified as a "known human carcinogen" by the U.S. EPA and the World Health Organization, and children are at greater risk from arsenic than adults because they are less able to metabolize the metal (NRC 1999). An average five-year-old, playing less than two weeks on a CCA-treated playset would exceed the lifetime cancer risk considered acceptable under federal pesticide law (see Endnote in Appendix for calculation details). A recent analysis by the University of Florida found that the lifetime increased risk of cancer for children regularly touching pressure-treated wood was as high as 1 in 1,000, a thousand times the risk deemed acceptable for pesticides under federal law (FDCA).

Study after study has confirmed the risks of arsenic wood preservatives, and over the past year there has been a flood of new evidence. It is clear that arsenic levels in commercially sold pressure-treated wood are high enough to pose an increased risk of cancer and other serious illness in the long term, and acute poisoning that could result in seizures or permanent nerve damage in the short term. Those risks are significantly increased for children, whose growing bodies are more susceptible to the harmful effects of arsenic.

Relying on a 1990 study by the U.S. Consumer Products Safety Commission (CPSC), the wood products industry claims that pressure-treated wood is safe. But an EWG analysis shows that the CPSC study is seriously outdated and inadequate. Among other shortcomings, the 1990 CPSC study:

- was based on tests that significantly underestimated arsenic contamination and exposure;
- fails to account for evidence linking arsenic to internal cancers;
- fails to account for new evidence that arsenic is an endocrine disruptor;
- fails to account for a recent study showing that children metabolize arsenic less efficiently than adults;
- and fails to consider the wood products industry's own analysis showing unsafe levels of arsenic on wood surfaces.

In recent months concern over pressure-treated wood has spread from the playgrounds of Florida, where dozens of public playgrounds have been closed after detection of high levels of arsenic, to the nation's capital, where the EPA announced on May 9 it was fast-tracking a review of cancer risks from CCA-treated wood. The debate over EPA's drinking water standards has raised public concern about arsenic, but the risk of exposure from pressure-treated wood is just as significant, and very likely more widespread. To protect the public from this significant source of arsenic exposure, the Bush Administration should suspend the use of CCA as a pesticide, and ban its use in consumer products. Congress should repeal the special exemptions CCA enjoys under hazardous waste laws.

Arsenic: The Wood Industry's Toxic Secret

CCA is Banned in Other Countries

CCA is banned outright in several countries, but thanks to an EPA decision during the Reagan administration to allow CCA for use in wood treatment, it's big business for the American wood products industry.

In 1996, more than 144 million pounds of CCA were used to treat 460 million square feet of commercial lumber (AWPI 1997). That's 30 million pounds of arsenic, making the U.S. wood products industry the world's largest consumer of the poison, using half of all arsenic produced worldwide. Since 1964, an estimated 550 million pounds of arsenic have been used in the U.S. to pressure-treat wood. (Figure 2.) That is more than enough to raise the level of arsenic in all the water contained in the Great Lakes by an amount greater than the drinking water standard proposed by the Clinton Administration.

The Clinton proposal would have reduced the current legal limit for arsenic in drinking water by 80 percent, still well above the level many scientists say is safe. After lobbying by the wood products industry, mining companies and some water suppliers, that proposal was suspended by the Bush Administration, which requested that the National Academy of Sciences conduct further review and recommend a specific arsenic limit rather than a range of possible limits. Bush EPA chief Christine Todd Whitman, however, promised the Administration will put forth a standard that lowers the limit for arsenic in drinking water by at least 60 percent.

Pressure-treated wood is ubiquitous, accounting for nearly a fifth of all softwood boards and timbers sold in the U.S. "Pressure-treated" sounds harmless, but it hides a toxic truth: Treated wood is injected with extraordinary levels of harmful pesticides.

Chromated copper arsenate, the compound most often used to protect wood from insect attacks and fungal decay, is 22 percent arsenic by weight (Solo-Gabrielle et al.2000). In 1997 over 90 percent of the treated lumber, timbers, posts, and plywood, and about 75 percent of U.S. treated wood volume overall, were produced with CCA (Solo-Gabrielle et al.2000).

When ingested or inhaled, arsenic is readily taken up by the body, but people exposed may be completely unaware since arsenic is tasteless, colorless and odorless. Arsenic causes a wide range of adverse health effects at high, moderate and low doses. High levels that are not immediately deadly can cause nerve damage, vomiting, fatigue, diarrhea, nausea and the decreased production of red blood cells. Similar effects can also occur after long term ingestion (5 to 15 years) of arsenic at low to moderate levels (NRC 1999).

Arsenic is classified by the EPA and the World Health Organization as a known human carcinogen. The association between arsenic ingestion and skin cancer has been recognized for more than a hundred

years (ATSDR 2000). Only recently, however, have scientists begun to recognize the many other cancers and health effects caused by chronic arsenic ingestion, and the extraordinarily low levels at which arsenic can be harmful.

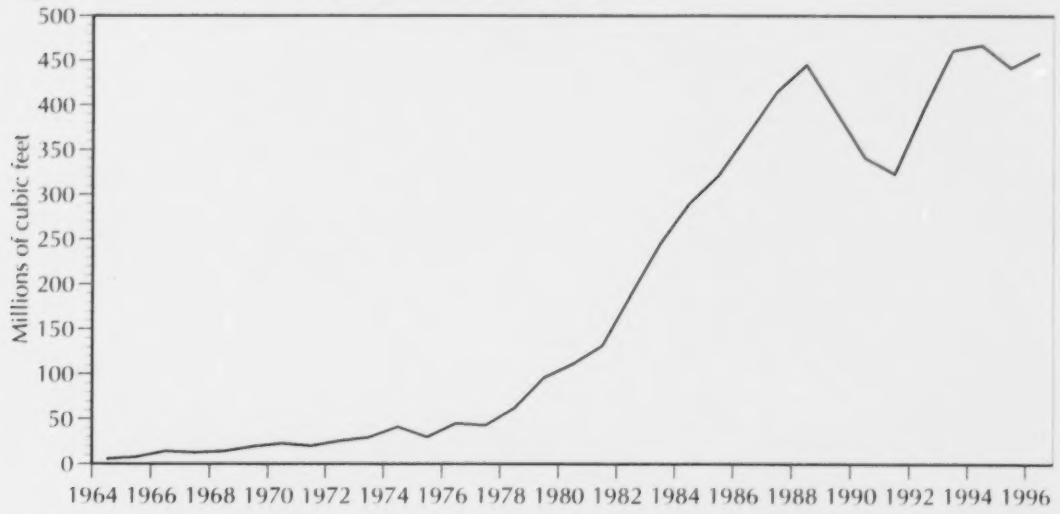
In 1999 the National Research Council assessed the risks of arsenic exposure and concluded that there are indisputable links to skin, bladder and lung cancer, and that there is some evidence to suggest links to kidney and liver cancer. These conclusions were based on human epidemiological studies in Taiwan, Chile, and Argentina, where whole populations were exposed to arsenic in drinking water – a notably rare instance of such extensive data of a chemical's effect on humans (NRC 1999). Research has also linked arsenic ingestion to immune system suppression, as well as increased risks of high blood pressure, cardiovascular disease, and diabetes (NRC 1999).

Arsenic Leaches out of Pressure-Treated Wood

The wood products industry claims that the wood treatment process, which involves forcing CCA into the wood under high pressure, "fixes" the pesticide in the lumber. The American Wood Preserving Institute, the industry's lobby, maintains that CCA does "not aggressively leach into the ground or waterways, drinking water supplies, or adversely affect marine life" (AWPI 2001). Yet numerous laboratory and field studies have found that arsenic does, in fact, readily leach out of wood.

Research on sawdust from CCA-treated wood found that more than half of the arsenic can leach out in only 40 days (Warner and Solomon 1990). Leaching would be expected to be much higher from sawdust than from intact wood, but numerous studies have also shown that the soil beneath CCA-treated wood structures have increased levels of arsenic. One study in Connecticut found levels of treated wood structures have increased levels of arsenic. One study in Connecticut found levels of arsenic up to 350 part per million (ppm) and averaging 76 ppm under CCA-treated decks four to 15 years old. Soil a few yards away averaged only 3.7 ppm (Stilwell and Gorny 1997). Another study of treated wood structures in Florida found the soils underneath to contain up to 217 ppm of arsenic, with an average of 28.5 ppm, while control soils averaged 1.5 ppm (Townsend et al. 2001). The Canadian government found levels of arsenic up to 80 ppm and averaged 50 ppm under play structures, while control soils average less than 1

Figure 2. Production of CCA Lumber: 1964 to 1996.



Complied from yearly reports from the American Wood Preservers Institute by Solo-Gabrielle et al. (1998).

ppm (HWC 1992). These findings have been confirmed by numerous recent tests of soils under municipal play structures in Florida which have shown elevated arsenic levels.

The leaching of arsenic is a major concern because of the amount of arsenic contained in a single piece of CCA treated wood – between 0.25 and 2.5 pounds of CCA per cubic foot, depending on the intended use of the wood. Based on the amount contained in the CCA-treated wood produced between 1964 and today, if just 5 percent of the arsenic leaches out, this would be enough to increase the concentration of arsenic in a volume of water equal to Lake Erie by 26 micrograms per liter – more than twice the Clinton Administration's proposed standard for drinking water.

Alternatives to CCA Exist

Safer wood treatment chemicals are being made by U.S. companies and marketed overseas as less toxic, more environmentally friendly alternatives to CCA. In the U.S., however, companies are careful not to promote alternatives in "any way that implies that CCA is unsafe," according to a spokesman for Osmose, a company which has just begun marketing non-CCA wood (EBN 2001). The most widespread wood preservative without arsenic is ACQ which is a mixture of copper and didecyl dimethyl ammonium chloride, commonly called quat. Sixty million board feet of ACQ-treated wood was sold in 1998 (Solo-Gabrielle et al. 2000). Unlike CCA, ACQ does not contain any EPA-listed compounds, nor any known or suspected carcinogens, and testing has shown it to have low toxicity (Solo-Gabrielle et al. 2000). Wood treated with ACQ as well as one other CCA alternative (copper boron azole, or CBA) has also been accepted by the International Conference of Building Officials for inclusion in the Uniform Building Code (Solo-Gabrielle et al. 2000).

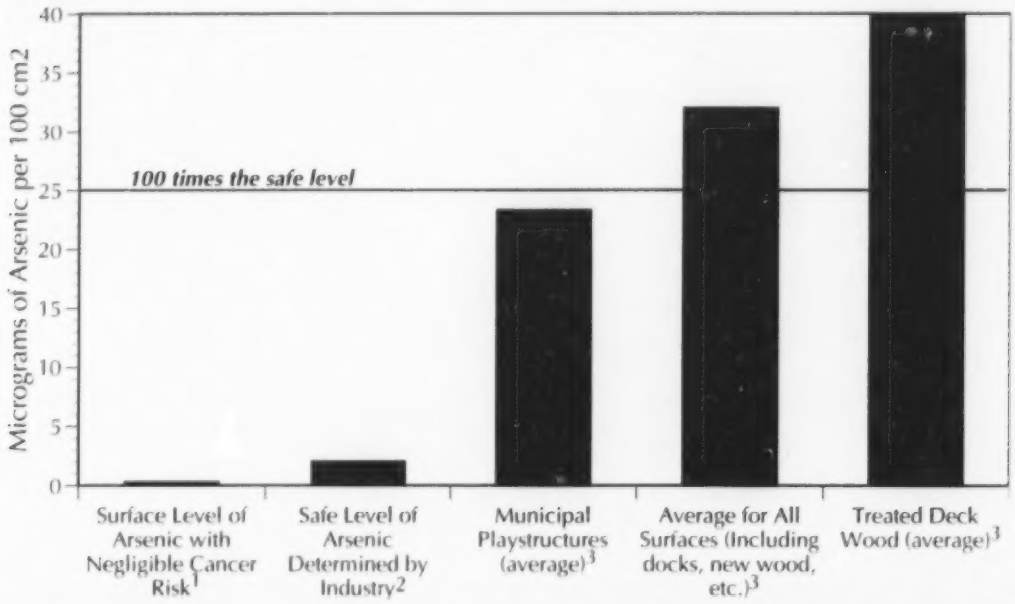
Arsenic-Treated Lumber Is Hazardous to Children's Health

'You Could Suck on a 2-by-4 and It Wouldn't Hurt You'

The wood treatment industry has repeatedly denied that arsenic residues on the surface of pressure-treated wood are dangerous. An industry representative went as far as to say that "You could basically suck on a 2-by-4 and it wouldn't cause you any harm" (Rist 1998). Numerous studies, however, have found that significant quantities of arsenic are in fact present on the wood surface and that it can be transferred to human skin, particularly hands, where it is then often ingested by children (Figure 3).

The amount of arsenic present on the surfaces of treated wood varies significantly, even on different areas of the same board. Samples taken by wiping just a 15-square-inch area of play structures

Figure 3. Arsenic-treated wood can expose children to more than 100 times the safe level of arsenic.



Source: Environmental Working Group. 1) "Safe" level corresponds to a 1 in 1 million lifetime cancer risk, according to assumptions presented in Roberts and Ochoa (2001). A 1 in 1 million cancer risk is considered "acceptable" under the safety standard contained in federal pesticide law. 2) Hazardous Substance and Waste Management Research, Inc. 2001. Letter from Christopher Teaf to Scott Ramminger, President and CEO of the American Wood Preservers Institute. April 9, 2001. 3) Average arsenic levels derived from 7 peer-reviewed or government studies. See Appendix for concentration data.

have been found to have averages of between 9 and greater than 100 micrograms of arsenic depending on the study (Stilwell 1998; HWC 1992; Galarneau et al. 1990; CPSC 1990; CADHS 1987). Wipes of new and aged CCA-treated boards have averaged between 40 and 69 micrograms of arsenic per 15 square inches (Stilwell 1998; CPSC 1990). In some cases, however, levels of arsenic have reached as high as 632 micrograms on a play structure pole and 1,000 micrograms on a pier (Stilwell 1998; CADHS 1987).

Even more alarming are the results of one study that looked at the arsenic accumulated on human hands. After rubbing pressure-treated playground equipment for 5 minutes, volunteers were found to have arsenic levels averaging 236 micrograms on two hands, with levels reaching up to 1,260 micrograms in one case (CADHS 1987).

The amount of arsenic that people might be getting on their skin from touching CCA-treated wood is high compared to the arsenic they consume through food and drinking water. The U.S. Food & Drug Administration recently analyzed the typical ingestion of inorganic arsenic through food for various age groups. They found that six-year-old children consume an average of 4.6 micrograms of arsenic per day in food (Tao and Bolger 1998). The amount of arsenic occurring in drinking water varies greatly by geographic region, but less than 10 percent of water systems exceed a concentration of 10 micrograms per liter, and less than 5 percent exceed 20 micrograms per liter (USGS 2000). Children age 4 though 6 drink an average of 0.45 liters of water a day; therefore most children are ingesting less than 4.5 micrograms of arsenic per day from water. The average five-year-old, therefore, is consuming less than 10 micrograms of arsenic a day from his or her food and water.

The same five-year-old could easily ingest 5 to 10 times more than this by simply playing on CCA-treated play structures. This fact was recently recognized by the Connecticut Department of Public Health. In a 1998 fact sheet titled "What you need to know about pesticides used in pressure treated wood," the agency states: "It is now clear that exposure from CCA-treated wood can be the major source of arsenic for children who frequently play on CCA-treated playscapes, treehouses, or decks" (CDPH 1998).

Children Are Most at Risk from Arsenic

Although very little arsenic is taken up through the skin, if ingested it is readily absorbed. Since children have a tendency to put their hands in their mouths, they are likely to be at the highest risk for arsenic exposure. In fact, a recent study that used videotape to analyze what children touch during the day found that kids put their hands in their mouth an average of six times per hour, and that this can range up to 45 times an hour for some children (Zartarian 1997). Based on its research of surface arsenic levels and using various assumptions of arsenic uptake, the California Department of Health Services estimated that a child might get a dose of between 24 and 630 micrograms of arsenic per visit to a play structure made of CCA-treated wood (CADHS 1987).

Recent research has also shown that children metabolize arsenic differently, making them more susceptible to its harmful effects. Arsenic is metabolized through a process called methylation which converts the metal into a less toxic form which is easier to excrete. Methylation reduces the amount of time the body is exposed to arsenic's toxic effects. Yet studies have shown that substantial variations exist in people's ability to methylate arsenic, and that children are not able to convert arsenic into less toxic forms as readily as adults (NRC 1999). Furthermore, research has also shown that people with poor nutrition may be more susceptible to arsenic-related health effects, meaning that low-income children may be especially at risk from treated wood (NRC 1999).

Federal Safety Study Outdated & Inadequate

National Research Council Urges Tougher Regulations

The current drinking water limit for arsenic is 50 parts per billion (ppb, a measure equal to micrograms per liter of water), which has been the standard since 1947. The Safe Drinking Water Act Amendments of 1986 required that the EPA set an enforceable drinking water limit by 1989. But a new standard was never set, despite EPA research in the 1980s showing that the 50 ppb level could be causing significant rates of skin cancer in the population. In 1999 the National Research Council reviewed the growing body of evidence that arsenic was even more harmful that previously thought. They concluded that the current limit was not adequately protective of public health and "requires downward revision as promptly as possible." In fact, NRC analyses showed that consuming arsenic at the current limit (100 micrograms per person per day) could lead to a cancer risk of between 1 in 100 to 1 in 1,000 (NRC 1999). Federal standards for most carcinogens in drinking water are set to limit cancer risk to 1 in 1 million.

The EPA responded by proposing a new standard of 10 ppb. Since the EPA's scientists had found that a purely health-based standard would be half that level, the proposal represented a concession to water suppliers' concerns about the cost of arsenic removal. But the Clinton rule was suspended by President Bush, who then directed the NRC to recommend a specific level between 3 and 20 ppb, rather than a suggested range of safe levels. A new study published in March 2001, however, added support to the already substantial evidence that the current limit is far too high. A Dartmouth College research team found that arsenic acts as an endocrine disruptor at very low concentrations, between 25 ppb and 50 ppb (Kaltreider 2001). In other words, arsenic can interfere with normal hormone activity in the body, which can lead to cancer and other diseases.

For years the wood treatment industry has held up a 1990 study by the U.S. Consumer Product Safety Commission (CPSC) as proof that touching treated wood poses no risk (CPSC 1990). The CPSC study has been criticized not only by University of Florida researchers, but also by the research group hired by the wood preservatives industry itself (Roberts and Ochoa 2001; HSWMR 2001). The CPSC shortcomings include:

- The commission tested unrepresentative samples of treated wood;
- CPSC used cancer potency estimates three times lower than determined by the EPA and confirmed by the National Research Council;
- CPSC ignored data showing that females may be getting higher doses of arsenic;
- CPSC failed to include multiple exposures to arsenic from skin absorption or soil ingestion, as well as touching other CCA-treated wood such as decks, railings and picnic tables.

The conclusions reached by CPSC are based on wood acquired from playground equipment manufacturers that had been altered by staining, sanding or molding. Four of the seven of the structures sampled had been stained and/or sealed, which had previously been shown to reduce the amount of arsenic picked up by wiping the surface (CADHS, 1987). It is not surprising, therefore, that four of the structures had detectable arsenic levels (up to 70 micrograms per 15 square inches, averaging 27 micrograms). The one piece of wood that had not been altered in any way (and represents the vast majority of wood kids are playing on and consumers are purchasing) had levels of arsenic that reached 153 micrograms per 15 square inches, and averaged 69 micrograms.

Along with unrepresentative sampling, CPSC's methodology also seriously underestimates the risks of handling arsenic tainted wood. For example, while the CPSC only assessed the risks of skin cancer, the National Research Council has since recognized the link between arsenic and a number of internal cancers (NRC 1999). Moreover, compared to the cancer risk factor determined by the EPA and confirmed by the NRC, the CPSC underestimated cancer risk by a factor of three.

CPSC's analysis was also flawed by overlooking data and additional routes of exposure. For example, the CPSC ignored information showing females may be ingesting more of the arsenic that gets on their hands. This data, indicating that females may be getting a dose 50 percent higher than males, was cited in the report, but their calculations only used data from males. The CPSC also did not take into consideration the many other places where children are likely to encounter CCA-treated wood on a daily basis, such as decks, railings, and picnic tables. Furthermore, CPSC also failed to assess the smaller but still likely significant exposure to arsenic obtained through skin absorption and contaminated soil ingestion.

Ultimately, the CPSC study did recognize that "a possible hazard might be created" when playground equipment or other structures were built with "pressure-treated wood from retail sources" (CPSC 1990). In fact, they recommended that further studies should be conducted on this matter. But nothing was ever done. The wood preservatives industry was careful to omit these statements from their materials describing the CPSC endorsement of CCA-treated wood.

Clearly, the CPSC analysis is inadequate. It is urgent that the Commission conduct a new and scientifically sound analysis, and suspend sales of CCA-treated wood pending their findings.

The Last of the Arsenic Pesticides

The EPA began investigating pesticides containing inorganic arsenic as far back as 1978 because of concerns over cancer, genetic mutation, and birth defects. The risks were found to be excessive, and as a result the EPA banned almost all uses of products that contained "inorganic arsenicals" in 1986. The EPA banned the remaining agricultural uses of inorganic arsenicals in 1993 (EPA 1993). Lobbying by the wood preservatives industry, however, has gained special treatment for CCA and pressure-treated wood time and time again.

Despite finding high risks to workers at wood treatment plants, the EPA agreed not to ban CCA if certain conditions were met. These included allowing only certified applicators to work with the chemical, mandating special protective clothing and respirators to be used by workers to reduce exposure, and requiring that no CCA residues be visible on treated wood. To protect consumers, the EPA also instituted a mandatory consumer awareness program (EPA 1986). Once again, however, after lobbying from the wood treatment industry, this requirement was eliminated and replaced with a voluntary program of distributing "Consumer Information Sheets" which have been shown to rarely, if ever, reach consumers. As a result, very few consumers are even aware that most pressure-treated wood contains arsenic or other pesticides.

Hazardous Waste Exemption

To assess toxicity of a waste product, the EPA administers a test (the Toxicity Characteristic Leaching Procedure, or TCLP) which mimics the conditions inside a city landfill. If any one of 39 contaminants, including arsenic, is found to leach out above a certain toxic threshold, the substance is classified as a hazardous waste. Although CCA-treated wood fails the TCLP test for arsenic, it is not regulated as a hazardous waste because of a regulatory exemption won by the wood treatment industry (Townsend et al. 2001). The regulatory language in the federal Resource Conservation and Recovery Act (RCRA) singles out CCA-treated wood for an exception: "The following solid wastes are not hazardous wastes: Solid wastes which consists of discarded arsenical-treated wood or wood products which fails the test for the Toxicity Characteristics for Hazardous Waste" (40 C.F.R. Section 261.4(b)).

This exemption has far-reaching effects. Because pressure-treated wood is not classified as a hazardous waste, it can be discarded at ordinary municipal landfills, or at construction and demolition landfills, many of which are unlined. When the EPA looked at leachates, or the liquids that leached from construction and demolition landfills, they found that 12 out of 16 sampled had detectable arsenic levels, with a median of 19.5 ppb. This indicates that unlined landfills containing pressure-treated wood may be leaching arsenic into groundwater at significant concentrations (EPA 1995).

Many construction and demolition landfills have moved to turning wood waste into mulch, which is then sold to consumers. Although pressure-treated wood is supposed to be separated out from wood for mulch, this is difficult in practice. A recent study found that mulch that used wood from construction and demolition landfills had leachates with arsenic levels between 65 and 164 ppb, compared to non-detectable levels from mulch that didn't use wood from construction dumps (Townsend et al. 2001).

Even the wood treatment industry itself has been surprised that CCA hasn't been further regulated. The marketing manager at Chemical Specialties, Inc. one of the major manufactures of CCA, stated in 1997: "I would have said four years ago that [something] would displace CCA. However, the regulatory changes that I think all of us thought were going to happen haven't really happened. In fact, it's gotten easier probably for people to use CCA over the years" (EBN 1997).

Evidence of CCA's Risks Is Mounting

Significant Cancer Risks

The wood treatment industry is also careful not to mention a study conducted by the California Department of Health Services in 1987. Based on samples taken from human hands touching in service playground equipment, CADHS estimated that children faced an additional lifetime skin cancer risk of between 6 in 1,000 to 1 in 10,000 from playing on treated wood play structures alone (CADHS 1987).

An analysis commissioned by the Florida Department of Environmental Protection and performed by researchers from the University of Florida confirmed these findings of significant risk. Combining data from a number of studies previously conducted, including arsenic absorption from skin, and using up to date cancer risk assessment factors, they found that the cancer risk from children regularly touching CCA-treated wood ranged from 4 in 100,000 to more than 1 in 1,000 (Roberts and Ochoa 2001). At the mean surface arsenic level found on play structures (23 micrograms per 15 square inches), the researchers estimate a cancer risk of 1 in 10,000 from children playing on treated wood for 5 years during childhood.

Even the industry's own studies show that the amount of arsenic on the surface of wood is too high to be safe. Early in 2001 the wood treatment industry commissioned and publicized the results of a study to refute the accusations that CCA-treated lumber could be causing harm. In April, however, they admitted that the study contained a mathematical error which underestimated the risks by a factor of 1,000 (HSWMR 2001).

Although the AWPI still maintains that the risks of CCA-treated wood are low, an internal memo explaining the adjusted values tells a different story. In calculating the amount of arsenic that should be allowed on the surface of wood, AWPI's new analysis showed that to protect human health arsenic levels should be 2 micrograms per 15 square inches, a level significantly lower than wipe and hand samples have found (HSWMR 2001).

Acute Injuries from Pressure-Treated Wood

The risk of cancer is a serious issue, but it is also subtle. Someone who contracts skin cancer 15 years down the road may not realize that playing on a treated wood playset during their childhood could have put them at risk. Even if they did, the connection is difficult or impossible to prove. On the other hand, a number of cases of arsenic poisoning from people working with CCA-treated wood have been documented:

- In 1978, workers who were building a pier in Monterey, Calif., developed arsenic poisoning from working with CCA-treated wood.

- In 1983 a U.S. Department of Agriculture employee experienced internal bleeding, followed by complete disability, after building picnic tables with treated wood. He sued CCA manufacturers and won more than $700,000 in a settlement, discovering in the process that manufacturers had reports of illness from workers sawing treated wood as early as 1968.

- A Washington State schoolteacher was partially paralyzed for three months from arsenic poisoning after building a swimming dock made of wood treated with CCA and settled with manufacturers in 1992.

- A contractor in Bloomington, Ind. suffers from decreased mobility and endured multiple emergency room visits and hospitalizations after getting splinters in his shin while building a deck with treated wood in 1996.

- A family in Wisconsin suffered serious illnesses, including seizures, after burning treated wood scraps repeatedly in their wood stove.

Conclusions and Recommendations

Conclusions

The United States imports millions of pounds of arsenic every year to saturate wood that is sold to consumers who are completely unaware of the poisons within. The treated wood ends up in children's play structures, decks, and picnic tables, rubbing off on the skin of children and adults who touch it. Over time the arsenic leaches out into the soil below, possibly contaminating groundwater. At the end of its useful life, the wood is not treated as hazardous waste because of regulatory exemptions won by the wood preserving industry. It can be disposed of in unlined landfills and made into toxic mulch that is sold to consumers. Each of these situations poses an unacceptable risk to public health.

Recommendations

To protect children from the harmful effects of arsenic-treated lumber, we recommend:

- The immediate switch from CCA-treated wood to safer alternatives by all home improvement retailers and playground equipment manufacturers.
- An immediate ban by the Consumer Product Safety Commission of all CCA-treated wood for use on playground equipment.
- Emergency suspension by the Environmental Protection Agency of CCA as a wood treatment pesticide.
- Prompt repeal by Congress of the hazardous waste exemption for arsenic-treated wood.
- A boycott of CCA-treated wood by the construction industry, at a minimum for all situations where children might come into contact with the wood.

What You Can Do

To protect your family from CCA-treated wood:

- Make sure that children wash their hands after playing on CCA-treated surfaces, particularly before eating.
- Don't let children eat at CCA-treated picnic tables. At a minimum, cover the table with a plastic-coated tablecloth.
- Seal CCA-treated wood structures every year with polyurethane or other hard lacquer.
- In new construction, use products that do not contain arsenic. One option is ACQ-treated wood.

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Summary of Data for Surface Arsenic Levels of CCA Wood and Soil Beneath Treated Wood Structures

Summary of Data for Surface Arsenic Levels

Study	Mean Surface Arsenic Level (ug/100cm2)	Number of Samples Taken	Range	Type of Surface
CADHS 1987	1131	1	1131	Dock
CADHS 1987	173	2	31-314	Playground equipment
EWG 2001	125	2	118-132	Playground equipment
Stilwell 1998	105	12	5-632	Vertical playground surfaces
CPSC 1990	69	5	20-153	New wood
Stilwell 1998	40	52	6-122	Deck wood
HWC 1992	15	9	5.2-42	Playground equipment
Stilwell 1998	8.8	45	2-45	Horizontal playground surfaces
CPSC 1990	8	35	ND-70	Manufactured playground equipment
Galarneau et al. 1990	4.3	40	0.05-32	Playground equipment

Note: For CADHS (1987) data, only a range of surface arsenic levels were given for playground equipment. This range was averaged to get a mean arsenic level, and only two samples were assumed to be taken (the actual number of samples taken was not cited). This study also cited a mean surface arsenic level for a dock that was sampled, but did not cite a range or the actual number of samples taken. It was assumed that only one sample was taken. EWG 2001 refers to two samples taken by the Environmental Working Group in February, 2001 of California playstructures. The mean surface arsenic level for CPSC (1990) for manufactured playground equipment refers only to the 12 of 35 samples where arsenic was detected. ND stands for not detected.

Summary of Data for Soil Arsenic Levels Under CCA Treated Wood Structures

Study	Mean Soil Arsenic Level (ppm)	Number of Samples Taken	Range	Mean Control Soil Arsenic Level (ppm)	Type of Structure/Soil
Stilwell et al. 1997	76	85	3-350	3.7	Decks ranging in age from 4 months to 15 years
HWC 1992	60	20	33-80	1.0	Soil Under Playground equipment
HWC 1992	40	30	34-44	0.2	Sand Under Playground equipment
Townsend et al. 2001	29	65	1.2-217	1.5	Soil Under Boardwalks
Galarneau 1990	3	4	0.03-9.6	0.1 - 0.4	Sand Under Playground equipment

ENDNOTE: *In this report arsenic consumption from food sources is taken as the a average amount of inorganic arsenic consumed in the diets of children age 6, based on market baskets collected by the FDA from 1991 to 1997. (Tao and Bolger 1998) Arsenic consumed in drinking water figures are based on the mean amount of water consumed (0.45 L/day) by children aged 4 to 6 through direct and indirect drinking water consumption at the different drinking water standards (10 and 50 ug/L). (EPA 2000) Estimated arsenic ingestion through playing on CCA-treated wood assumes an 18 kg child (40 pounds, an average weight for a 5-year old), with a hand surface area of 228 cm2, consuming 0.31 handloads per day and having dermal absorption of 1 percent, consistent with assumptions and calculations in Roberts and Ochoa (2001). The surface level of arsenic on the play structures is assumed to be 24.3 ug/100cm2. This is a reasonable assumption given that studies or arsenic levels on playground equipment have found mean levels ranging from less than 10 to more than 100 micrograms of arsenic per 100 cm². (CADHS 1987, Galarneau et al. 1990, CPSC 1990, Stilwell 1998, HWC 1992). Calculations involving cancer risk assume a 5-year-old weighing 40 pounds is exposed to arsenic daily through contact with pressure-treated wood,and assuming a total lifespan of 70 years, with a cancer slope factor of 1.5 per mg/kg-day (Roberts and Ochoa 2001).*

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